Smart Nation meets privacy-preserving analytics

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Agenda

Problem and Objective

Our Innovation

Value Proposition

Singapore & the World
Attack vs Defense

Known vectors

Unknown vectors

Software bugs, mis-configurations, human incompetence, vulnerabilities ….
Distrust

No trusted framework for collaborative work among partners, contractors, vendors, ISV and service providers

Malicious entities

Wannacy, Mirai, Kovter…..an ever expanding soup of malwares and related actors.

Regulatory pressure

PDPA, GDPR….with legal binding.

So much data………so little insights

Finance info

Health info

Join without REVEALING!!

Insurance info
The Problem

How to securely combine, aggregate and analyze data from disparate sources to reveal insights that are hidden otherwise?

Sharing sensitive data as-is is too risky and often illegal

Encrypted data with off-the-shelf cyber security products is useless for analysis
Objective

Singapore’s vision for a Smart nation mandates data-driven planning and forecasting

“A collaborative data analysis platform that guarantees data security and privacy in the absence of mutual trust facilitates this vision.”

Such a platform will have direct application for: Finance / Banking / Insurance, Threat Intelligence, Healthcare, Government Agencies.
The Solution.
Secure Multi-Party Computation (SMPC)

Enabler of seamless data integration between variety of organizations without risk of privacy breach – a key requirement of Smart Nation development

- SMPC guarantees that none of the parties learn the inputs
- SMPC gives everybody the aggregated output of computation
- SMPC is able to operate with malicious agents in the system
- SMPC is key-less unlike homomorphic systems

Secret Sharing “Shared-Nothing Data”
Data submission from multiple parties

Financial organizations

Health care organizations

Anonymization process
Data splitting into shares

Every cell is split into secret shares

Transferring all shares to Secure Engines

SMPC

Multi-cloud/ On-prem Secure Engines

No one party learns the actual data
Query parameters submission

SMPC

Secure Engines

PRIVATE USER INTERFACE

Data Analysts

68%
Results retrieval

SMPC

Secure Engines

PRIVATE USER INTERFACE

Data Analysts

100%
Platform Actors

**Data Sources**
Entities / individuals who are generators and providers of data

**Data Contributors**
Businesses / companies who collect and store data from the sources and contribute them for aggregate analysis/study

**SMPC**
The medium where the contributed data is being aggregated and analysed as per requests of the Data Queries

**The Platform (SMPC)**
The platform where the contributed data is being aggregated and analysed as per requests of the Data Queries

**Data Querying Party**
Government agencies or authorized organizations that are analyzing the aggregated data in order to produce value for the people in the country
Acronis SMPC Trial Platform

Acronis Singapore R&D Centre
**Acronis SMPC Trial Platform**

- **Submit data to SMPC engine below**
  - Select a CSV file to upload
  - Submit

  - **Multiple input parties**
  - **Secure and anonymized data submission**

- **Submit queries to SMPC engine below**
  - Report Generation
  - Ad-hoc Querying

  - **Type of query**
    - Percentile of Savings (Inner join)
    - Percentile of Savings (Inner join)
    - Percentile of Savings (Outer join)
    - Mean Term Insurance
    - Count based income tax

  - **Secure compute on joined data**
Platform performance

![Platform performance chart](chart.png)
Platform performance
Platform architecture

Orchestrator

ETL

Anonymizer

Web Service

Control Panel

Queries
Logs
Activity
Status

Engine
Proxy
Vault

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“Secure – Private” Analytics

Secure Advanced Analytics
Classification, Regression, Neural nets and many more.
The Value Proposition

Deep insights
- Data driven policy and decision making.
- Improved visibility and execution of programs.

Monetization
- Unlock new streams of revenue and profitability from data you already own.
- Quicker ROI

Competitive advantage
- Leverage right information at right time.
- Data driven marketing.

Regulation and compliance
GDPR, PDPA.

Beneficiaries:
Governments and state bodies • Banks, insurance and financial institutions • Medical and healthcare players • Research and academia • Retail and consumer • and many more…
SMPC stories from the world!

EU
Students and Taxes correlation study
Estonian Center of Applied Research
10 Million+ records from two mutually exclusive govt. agencies:
Aggregation and statistical analysis with privacy.

EU
Payroll processing on public cloud
Ministry of Finance of Malta (MFIN)
Collaborative processing of data from taxpayers, employers, banks and SMEs on public cloud with guarantees on confidentiality and privacy.

USA
Government programs
Evidence-Based Policymaking
Increase availability and use of data in to build evidence about government programs, while protecting privacy and confidentiality.
Potential adopters in Singapore
Work with us!

Collaborators | Partners | Trials | Demos

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